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Empowerment of Farming Communities to Increase Production Through the Use of Agricultural Machinery in Corn Cultivation Activities in Sitiung Village Dharmasraya Regency

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ABSTRACT

This community service activity aligns with the Student KKN activities in Nagari Sitiung, Sitiung District, Dharmasraya Regency. The integrated community partnership program with student activities is carried out to increase corn production through technology transfer using wooden or bamboo hoes with semi-mechanical corn planting tools. The activity methodology is carried out by approaching corn farmers at the Nagari Sitiung partner location, Sitiung District, Dharmasraya Regency, through data collection and counseling activities with a participatory approach. Furthermore, corn planting tools were introduced through training and demonstrations on the corn farmer's land in Nagari Sitiung. So far, many farmers have planted corn manually. This causes a relatively long planting process because the land is very large. The rolling planter corn planting tool provides various significant benefits for corn farmers because it can help increase the efficiency of time and energy in the planting process, thereby accelerating the production stage. This tool also reduces dependence on human labor, directly reducing operational costs. In addition, this corn planting tool can improve the accuracy of planting distances, which helps optimize land production and produces more uniform plants, and it has the potential to increase yields.

Keywords: corn cultivation, Nagari Sitiung, planting tools, rolling planter

INTRODUCTION

Nagari Sitiung is located in a lowland area with an altitude of 100-135 meters above sea level, at coordinates 00°59.753' South Latitude and 101°37.776' East Longitude. The total area of Nagari Sitiung is 5,164 hectares. According to (BPS, 2019), the harvested area of corn in Sitiung District is 248.5 hectares, with a total production of 1,439 quintals. One of Nagari Sitiung's leading agricultural products is corn. The demand for corn continues to increase for food consumption as a carbohydrate source and livestock feed. The demand for feed corn has already reached more than 50% of the national requirement. This is due to the high volume of industries processing corn into livestock feed and the increasing number of poultry farmers who need carbohydrate-rich feed for the growth of their livestock.

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According to (Waslah et al., 2021), corn is a highly strategic commodity, playing a crucial role in the food security system and serving as a key driver of the national economy. It also stimulates the growth of upstream industries and boosts downstream industries, significantly contributing to national economic growth. Furthermore, corn is one of Indonesia's primary food crops and holds an essential role in the economy. Besides being a staple food, corn has multiple functions as a raw material for animal feed, an industrial raw material, and an alternative biofuel source (Suryana & Agustian, 2016).

The use of agricultural machinery at the farmer level, especially for planting and fertilizing, is still rare, while the availability of agricultural labor continues to decline (Fitri Amalia et al., 2020). Similarly, many corn farmers in Nagari Sitiung still plant corn manually. This results in a relatively long planting process due to the vast area of farmland. Based on this, it is crucial to develop improved corn farming technology in Nagari Sitiung, Sitiung District.

Considering the existing potential and challenges, developing corn farming technology is essential to enhance productivity and ensure the sustainability of the agricultural sector in Nagari Sitiung, Sitiung District. With these efforts, it is expected that Nagari Sitiung can optimize its agricultural potential, not only to meet local needs but also to contribute to national food security. The objectives of this community service activity are: 1).to utilize appropriate tools that match the soil contours and farmers' capabilities in corn cultivation activities, 2) to increase work efficiency, thereby reducing production costs and maximizing profits, ultimately improving farmers' income, and 3). to enhance agricultural yields and quality.

METHOD

The PKM-TKM program is implemented using a participatory and action-based approach within the targeted corn farmer groups. This community service activity begins with engaging farmers to foster and enhance the motivation of farmer groups, ensuring that the PKM-TKM program is well received and effectively implemented. The main focus of this initiative is to assist the community in addressing challenges related to corn planting. The activities are carried out in several stages, as follows:

1. Preparation Stage

a. Engagement with farmers, establishing contact with corn farmers in the partner location of Nagari Sitiung, Sitiung District, Dharmasraya Regency.Students will conduct direct technical activities involving the community, such as data collection and extension services, using a participatory approach in Nagari Sitiung.
b. Preparation of Tools and Corn Planting Machines. The equipment used will be adapted to the land conditions in Nagari Sitiung. The team will first conduct a survey of corn farmers' fields to determine the most suitable machinery and tools.

2. Implementation Stage

a. Introduction of Equipment
   To support the success of the community service program (PK), the initial step is to hold a Focus Group Discussion (FGD) with local farmers. The purpose of the FGD is to identify the farmers' perspectives and understanding of the program, as well as to build a shared vision regarding its objectives, benefits, and implementation process.
b. Training and Demonstration
   Pre-training preparations: 1) developing training materials covering information on corn planting equipment, usage methods, safety, and maintenance, and 2) Selecting a suitable location for demonstrations in the field or farmland.

RESULTS AND DISCUSSION

Nagari Sitiung is one of the villages in Sitiung District, Dharmasraya Regency, West Sumatra Province, Indonesia. This village is known as a highly productive agricultural area, with corn as one of its primary commodities. As a central corn-producing region, Sitiung plays a significant role in supporting both regional and national food security, particularly in supplying raw materials for the food and livestock feed industries. The vast cornfields in Nagari Sitiung can be seen in Figure 1.

Figure 1. Corn fields in Nagari Sitiung

The corn fields in Nagari Sitiung represent one of the region's key agricultural potentials. With fertile soil and a favorable climate, corn has become a leading commodity for the local community. Corn production in Nagari Sitiung not only meets local demand but is also distributed to various other regions in West Sumatra and beyond.

Typically, corn farming in Sitiung is managed by local farmers using traditional methods, such as planting corn with wooden sticks or tugal. This practice is illustrated in Figure 2.

Figure 2. Traditional corn planting tool

Figure 2 documents the activities of farmers in the corn planting process in Nagari Sitiung. Corn seeding in Nagari Sitiung, Dharmasraya Regency, is conducted without soil tillage, generally using traditional planting methods with a tugal (wooden dibble stick). The tugal has a working capacity of approximately 0.167 hectares per hour.

Traditional corn planting requires significant time, labor, and operational costs, with relatively low work capacity and efficiency. The tugal tool relies on direct human effort, making it highly dependent on the physical capability and speed of the worker. This method is relatively slow and inefficient, particularly for large-scale farming.

The actual work capacity refers to the efficiency of agricultural machinery based on the total area covered within a given time. In comparison, the rolling planter has a working capacity of 0.625 hectares per hour. The rolling planter corn seeder is shown in Figure 3.

Figure 3. Rolling planter

Figure 3 illustrates the introduction of the rolling planter corn seeder to the community through demonstrations and training sessions for farmers. These activities aim to provide farmers with a clear understanding of the usage, maintenance, and repair of the equipment. This initiative is crucial, as stated by Hermawan (2011), who noted that the corn planting period is very short. To plant corn on a 1-hectare field, a farmer typically requires the assistance of 10 workers. These workers manually create planting holes using a pointed wooden stake (tugal), insert corn seeds into the holes, and cover them within two working days (equivalent to 20 labor hours per hectare).

Based on these calculations and subsequent evaluations, farmers who have adopted the rolling planter corn seeder have experienced increased productivity and ease of planting compared to manual methods. This has also sparked greater interest in adopting simple technologies to support sustainable agriculture. This community engagement initiative has successfully raised awareness and developed new skills among farmers while encouraging more practical and efficient agricultural innovations. Figure 4 presents the field trial of the rolling planter corn seeder on a farmer's land in Nagari Sitiung.

Figure 4. Rolling planter corn seeder trial

The rolling planter is an innovative planting tool designed to enhance efficiency and accuracy in the corn planting process. By using a rolling planter, farmers can ensure uniform seed distribution while significantly reducing planting time. This tool is equipped with a rotating wheel mechanism and a seed storage tube, which facilitates precise seed placement and spacing according to specific requirements.

According to (Zubachtirodin et al., 2016), the recommended seed quantity for corn planting is two seeds per hole for a planting distance of 75 x 40 cm and one seed per hole for a distance of 75 x 20 cm. The rolling planter, with a working capacity of 0.625 hectares per hour, is significantly more efficient compared to the traditional tugal tool, which has a capacity of only 0.167 hectares per hour.

Although the rolling planter requires a higher initial investment, its faster operation, reduced labor costs, and improved crop yields make it a more economical and sustainable solution for large-scale corn farming.

Figure 5. Group photo with corn farmers at the trial field

Figure 5 captures a meaningful moment of togetherness, where farmers actively demonstrate the use of the rolling planter corn seeder. The presence of this tool not only simplifies the planting process but also brings new hope for farmers to enhance their crop yields. The smile on the farmers' faces in the photo reflect their enthusiasm for this user-friendly technological innovation.

This photo symbolizes the collaboration between technology and the farmers' dedication in managing their fields. It also serves as evidence that modernization in the agricultural sector can drive both productivity and prosperity. Figure 6 presents the handover ceremony of the rolling planter corn seeder to the Wali Nagari.

Figure 6. Handover of the rolling planter corn seeder

As the program concluded with great enthusiasm, the community service team from Andalas University symbolically handed over the rolling planter corn seeder to the Wali Nagari of Sitiung. This handover represents support for the development of the local agricultural sector, particularly in the effort to modernize corn planting processes.

This tool is expected to assist farmers in Nagari Sitiung in improving work efficiency and harvest results. The handover also marks a shared commitment between the local government, farmers, and supporting organizations to continue innovating and driving progress in the agricultural sector. With the introduction of the rolling planter, Nagari Sitiung is expected to become a model for the successful implementation of modern technology in sustainable agriculture.

For the sustainability of the program, it is hoped that the collaboration between the Research and Community Service Institute of Andalas University and the corn farmer groups will continue to thrive, ensuring ongoing support for the program's continuity. The next phase of community service in Nagari Sitiung could involve activities related to corn harvesting and post-harvest processes. One of the post-harvest tools that could be introduced is a corn thresher and corn crusher for animal feed.

CONCLUSION

The introduction of innovative corn planting technology is greatly needed by farmers to broaden their knowledge in corn cultivation. The rolling planter is an efficient and practical planting tool that allows precise control over seed quantity and planting distance. With the rolling planter, the corn planting process becomes more practical, time-efficient, and targeted. Farmers only need to set the tool according to the recommended seed quantity and planting distance, then operate it directly on the land. This tool provides a modern solution for farmers to manage their fields more efficiently.

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